

GIS-based Modelling of the Hazard Potential of Mass Movements in the Flysch Zone of the Northern Vienna Forest

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Due to the geomorphological setting of Austria, landslides are a major natural hazard, as the Alps constitute 62 % of the territory, and the foothills at the base of the Alps and Carpathians cover 12 %. On the other hand, main natural triggering factors of landslides in Austria include long lasting heavy rainfall and rapid snow melting (Schweigl and Hervas 2009). Although large mass movements are rare, the resulting economic loss is huge, because of the high number of

small events, which cause considerable damage to infrastructure and arable land (Schwenk et al. 1992). Landslide research in Austria is mainly concentrating on the high Alpine region; nevertheless numerous landslides occur in subdued mountains.

The region investigated in this study represents an undulating landscape of the central European low mountain regions, located in the Vienna Forest (Lower Austria). The study area comprises parts of the Rhenodanubian Flysch Zone and the small sized Klippen Zone situated within the Flysch area. Landslides are widespread and frequent in these zones; although they cover only 8.9 % of Lower Austria, 60 % of the landslides occurred in the Flysch and Klippen Zone (Schwenk et al. 1992). Current studies in the Vienna Forest (Damm et al. 2008; Terhorst et al. 2009; Damm and Terhorst 2010) aim to identify causes for landslides and describe the evolution and the sequences of sliding processes on local scale in the study area. However, the mapping and delineation of areas susceptible to landslides are lacking, although

they are essential for spatial planning and decision making processes in regional planning in Lower Austria.

The objective of the project is to delineate landslide prone areas and to deliver quantitative information on landslide susceptibility, which can be used as decision support in spatial planning. The proposed research work will enhance the knowledge about the distribution and causes of landslides in the Vienna Forest Flysch Zone.

On the base of historical and present-day archives, a georeferenced landslide inventory will be compiled. The inventory will focus on spatial distribution of naturally occurring sliding processes, which represent the predominate type of mass movement in the Vienna Forest. The inventory data will be checked in selected landslide areas by field surveys.

Based on the landslide inventory and the controlling geofactors, which create the preconditions for landslides, a comprehensive susceptibility map will be produced for the whole investigation area. This disposition model will be the first existing for the Northern Vienna Forest.

A statistical/probabilistic approach (Agterberg et al. 1990; Bonham-Carter et al. 1989; Bonham-Carter 2002; Sawatzky et al. 2009) will be applied for the assessment of the landslide susceptibility, because of the scale of the study area and data availability. By means of this method the distribution of landslides can be analysed in detail, and new information on the relation of sliding processes to specific controlling geofactors can be created. The statistical/probabilistic model will be complemented by deterministic modelling approaches. Physically based models (e.g. Pack et al 1998) will be applied on selected test sites in the study area where the soil-mechanical parameters are captured and high resolution (1 m) digital elevation models are available, originating from airborne laser-scanning. The objective is to consider the special geotechnical settings of different Flysch formations as well as soil wetness and climatic fac-

tors, like heavy rainfall. Analytical hillshades will be produced on the basis of the high resolutions terrain data. These data will be used for exact mapping and identification of landslide scars.

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